

SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT I, JUN TAKAHASHI, a citizen of Japan residing at Kanagawa, Japan have invented certain new and useful improvements in

NETWORK FACSIMILE APPARATUS

of which the following is a specification:-

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a network facsimile apparatus, and, in particular, to a technology  
5 in carrying out an electronic-mail transmission of a communication management report concerning facsimile communications performed in the network facsimile apparatus.

10 2. Description of the Related Art

Conventionally, communication management information obtained from collecting communication management reports output from a facsimile apparatus is used for management of the total number of sheets of  
15 facsimile communication documents/letters, communication bill calculation, management of communication results, or so. However, since, conventionally, communication management reports are provided by sheets of paper, they may be erroneously taken away by an unauthorized person  
20 together with another document, and, thus, may be lost in some case. Accordingly, actually it may not be possible for an authorized person to completely collect the communication management reports.

Japanese laid-open patent application No.  
25 2000-261640 proposes a method for solving such a problem

for example. According to this related art (referred to as a first related art), upon receiving a predetermined command e-mail (electronic mail) requesting communication management information via a communication network, for example, the Internet, a facsimile apparatus transmits a communication management report to the source of the command. According to this method, there is no need to output the report by a sheet of paper, and, thus, no case occurs where the report is lost.

Japanese laid-open patent application No. 10-98606 discloses another configuration of providing report data without using paper resource. In this configuration (referred to as a second related art), when a number of records in the report data reaches a predetermined value in a relevant communication terminal apparatus, the report data stored is transmitted to a computer via a communication network.

## 20 SUMMARY OF THE INVENTION

However, even in the method according to the first related art, the command e-mail may not be necessarily issued only when the communication management information cumulatively stored in a storage device in the machine becomes full so that it should be

then renewed. Accordingly, the communication management information thus collected in a user may include duplication or a lack in the information of record. Accordingly, it is necessary to provide a system by  
5 which the user can collect the communication management information efficiently without omission in the information.

It is an object of the present invention is to provide a network facsimile apparatus in which a user  
10 can efficiently collect communication management information without omission in the information, and, thus, to improve a user's convenience in using and operating the machine properly.

According to the second related art, the  
15 information is transmitted to the predetermined computer via the communication network when the number of records stored until then reaches a predetermined number. However, a user may wish that a timing of such a transmission of the information may be set or specified  
20 according to various requirements other than simply the number of records stored.

Another object of the present invention is thus to provide a network facsimile apparatus in which communication management information can be collected  
25 according to even various items of requirements of a

user, and, thus the user's convenient can be further improved.

For this purpose, according to the present invention, a configuration is made in a network facsimile apparatus in which a timing at which a report of communication management information is sent to a host apparatus or so can be set by a user or supervisory person even in various items in various ways, and, thus, the user/supervisory person can obtain the information in various items in various ways according to the user's requirements. Accordingly, the user can perform management work concerning the operation of the network facsimile apparatus efficiently by collecting only necessary information without lack at the optimum timing.

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#### BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and further features of the present invention will become more apparent from the following detailed description when read in conjunction with the accompanying drawings:

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FIG. 1 shows a block diagram of a network facsimile apparatus according to an embodiment of the present invention;

FIG. 2 shows a flow chart illustrating an operation performed in the network facsimile apparatus

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shown in FIG. 1 for performing electronic mail transmission of communication management report performed when a predetermined storage capacity becomes full of cumulative communication management information;

5               FIG. 3 shows a flow chart illustrating an operation performed in the network facsimile apparatus shown in FIG. 1 for performing electronic mail transmission of communication management report performed when a predetermined communication charge is  
10              reached by a calculated cumulative one occurring due to actual communications performed by the apparatus;

              FIG. 4 shows a flow chart illustrating an operation performed in the network facsimile apparatus shown in FIG. 1 for performing electronic mail  
15              transmission of communication management report performed when a predetermined number of communication occurrences is reached by an actual cumulative one occurring due to actual communications performed by the apparatus;

20              FIG. 5 shows a flow chart illustrating an operation performed in the network facsimile apparatus shown in FIG. 1 for performing electronic mail transmission of communication management report performed periodically;

25              FIG. 6 shows a flow chart illustrating an

operation performed in the network facsimile apparatus shown in FIG. 1 for performing periodic electronic mail transmission of communication management report concerning transmission error occurrences;

5               FIGS. 7A through 7E illustrate an example of a guidance given by the network facsimile apparatus shown in FIG. 1 for an operator, and an operation procedure thus executed by the operator on the apparatus;

              FIG. 8 illustrates an example of mail  
10 communication setting list printed out by the network facsimile apparatus shown in FIG. 1 for an operator to recognize the current set contents in the apparatus;

              FIG. 9 shows a flow chart illustrating an operation performed in the network facsimile apparatus  
15 shown in FIG. 1 for performing electronic mail transmission of communication management report performed each time when a predetermined number of communication error occurrences is reached by an actual cumulative number of error occurrences;

20               FIG. 10 shows a flow chart illustrating an operation performed in the network facsimile apparatus shown in FIG. 1 for performing electronic mail transmission of communication management report performed periodically based on a predetermined  
25 requirement previously registered in the apparatus;

FIGS. 11A through 11C illustrate an example of a guidance given by the network facsimile apparatus shown in FIG. 1 for an operator, and an operation procedure thus executed by the operator on the apparatus  
5 for communication error reporting;

FIGS. 12A through 12C illustrate an example of a guidance given by the network facsimile apparatus shown in FIG. 1 for an operator, and an operation procedure thus executed by the operator on the apparatus  
10 for setting a reporting timing;

FIGS. 13A through 13C illustrate an example of a guidance given by the network facsimile apparatus shown in FIG. 1 for an operator, and an operation procedure thus executed by the operator on the apparatus  
15 for mail backup transmission; and

FIG. 14 illustrates an example of a communication management report in general.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

20 According to the present invention, preferably, a network facsimile apparatus includes a display unit to display the contents of operation or operation guidance, an output unit to output various reports/lists, an input unit for an operator to input data according to the  
25 guidance displayed on the display unit, a memory device



to store the thus-input data, a facsimile  
transmission/reception device, an electronic mail  
transmission/reception device to transmit or receive  
electronic mails to or from a host apparatus(es)  
5 connected to a communication network, a communication  
result information storage device to store communication  
result information, and a communication management unit  
to manage the communication result information.

Furthermore, when predetermined requirements  
10 are satisfied, the network facsimile apparatus may send  
out a communication management report including the  
communication result information via electronic mail to  
a destination which is previously registered. According,  
the communication management information can be  
15 collected efficiently without omission in the  
information, and the user's convenience can be improved.

Moreover, in the network facsimile according  
to the present invention, when the communication result  
information storage device becomes full in its storage  
20 capacity, a communication management report including  
communication result information may be transmitted via  
an electronic mail, to the address(es) previously  
registered. Accordingly, the user can collect the  
communication management information efficiently without  
25 omission, and the user's convenience can be further

improved.

Further, based on previously registered user code and communication charge rate, according to a predetermined procedure, a communication management  
5 report including communication result information may be transmitted via an electronic mail, to the address(es) previously registered when the communication charge result thus obtained reaches a predetermined value for the user code. Accordingly, the predetermined  
10 supervisory person can know the communication charge result for each user timely, and, thus, even in case the communication charge result on a particular user exceeds the estimation, the supervisory person can know such a situation timely. Further, the information thus  
15 collected can be utilized in analysis in total cost management which will be made by the supervisory person afterward. Thus the user's convenience can be further improved.

Further, based on previously registered user  
20 code and number of communication records, according to a predetermined procedure, a communication management report including communication result information may be transmitted via electronic mail, to the address(es) previously registered when the number of communication  
25 records thus obtained as the communication result

reaches a predetermined value for the user code.  
Accordingly, the predetermined supervisory person can  
know the number of communication records for each user  
timely, and, thus, even in case the number of  
5 communication records on a particular user exceeds the  
estimation, the supervisory person can know such a  
situation timely. Further, the information thus  
collected can be utilized in analysis in counting  
management which will be made by the supervisory person  
10 afterward. Thus the user's convenience can be further  
improved.

Furthermore, when a previously registered  
specific date/time is reached according to a  
predetermined procedure, the communication management  
15 report including communication result information may be  
transmitted via electronic mail, to the address(es)  
previously registered. Accordingly, the predetermined  
supervisory person can receive the communication  
management report periodically, and, thus, the  
20 information thus collected can be utilized in analysis  
in counting management which will be made by the  
supervisory person afterward. Thus the user's  
convenience can be further improved.

Moreover, the communication management report  
25 including communication result information may be

transmitted via electronic mail to the address(es) previously registered when the number of communication records concerning abnormal or failure communication occurrences reaches a predetermined threshold.

- 5 Accordingly, the predetermined supervisory person can recognize timely some trouble in the communication machine or other communication facilities or so. Thus the user's convenience can be further improved.

The communication management report may  
10 include communication management information of periodic occasions of, if any, transmission errors which occur, at previously registered intervals, according to a predetermined procedure. Accordingly, the supervisory person can periodically recognize an occasion of  
15 transmission errors timely, and, thus a proper action for countermeasure thereto can be provided timely. Thus the user's convenience can be further improved.

Moreover, by inserting the reason for transmission into a mail title of each electronic mail  
20 including the communication management report, the supervisory person or user who has received it can recognize the contents of the report easily. Thus the user's convenience can be further improved.

With reference to the figures, a configuration  
25 of a network facsimile apparatus according to one

embodiment of the present invention will now be described in detail.

FIG. 1 shows a block diagram showing the network facsimile apparatus according to the embodiment of the present invention. The network facsimile apparatus 10 includes a scanner 11 for reading a draft image to be transmitted, a plotter 12 for printing out an image received, a CODEC 13 for appropriately transforming data form of the image data to be received/transmitted, a system control 14 which controls the entire apparatus, a system memory 15 utilized appropriately by the system controller, an image information memory 16 storing image data for facsimile transmission/reception, an operation display 17 as a user interface, a communication control 18 for facsimile communications, and an e-mail communication control 19.

These respective parts are connected mutually via an internal bus 20. A modem 21 and a DTMF detector 22 are connected to the communication control 18. A network I/F 23 are connected to the e-mail communication control 19. A plurality of host apparatuses 40-1 through 40-n, as well as the network I/F 23 in the apparatus, are connected to a network 30 such as the Internet.

The scanner 11 reads a draft or a document to

be sent. The plotter 12 records image information, a report, an answering sheet, etc. received. The CODEC 13 performs coding/decoding on image information. The system control 14 manages the entire system control.

- 5 The system memory 15 is a memory which is used as a work area used by the system control operation made by the system control 14. The image information memory 16 stores image information if necessary in processing of image/drawing data in facsimile communication operation.
- 10 The operation display 17 includes keys, LEDs, LCDs, etc., and gives guidance/instructions to a user and accepts operation made by the user according to the guidance/instructions given. The communication control 18 manages facsimile transmission control. The e-mail
- 15 communication control 19 manages electronic mail transmission and reception.

The modem 21 performs modulation/demodulation on an analog signal between a public telephone network 50 and communication control operation performed by the communication control 18.

20 The DTMF detector 22 detects a DTMF signal sent from the public telephone network 50. The network facsimile apparatus 10 performs the facsimile transmission/reception with other apparatus via the public telephone network 50 such as a PSTN. The

25 network I/F 23 acts as an interface for connecting the

apparatus 10 with the communication network 30, and for example, is made of an NIC (Network Interface Card), etc.

FIG. 2 shows a flow chart which shows operation of the network facsimile apparatus 10 shown in FIG. 1. The operation of FIG. 2 is performed in a case where, upon a communication management buffer provided in the system memory 15 becoming full in its storage capacity, a communication management report is produced automatically from communication management information stored, and the report is transmitted via electronic mail automatically.

First, an operation for a facsimile transmission is performed (in Step S101). After producing and storing communication management data concerning the facsimile transmission (in Step S102), it is determined whether or not the communication management buffer becomes full in its storage capacity (in Step S103). When it has not become full yet (No in Step S103), the current processing is terminated. When it has become full (Yes in Step S103), it is determined whether or not a setting is previously made such that the report is transmitted via an electronic mail (in Step S104). When such a setting is not made, the current processing is terminated (NO in Step S104).

When such a setting is previously made, the

communication management report is produced (Yes in Step S104, and in Step S105), and the report is transmitted via electronic mail (in Step S106). A subject name of the electronic mail is 'a communication management  
5 report - automatic output report', for example. The contents of the communication management report are such as those shown in FIG. 14, for example. As shown, the communication management report may recite the communication management data produced and stored for  
10 each occurrence of communication operation such as a facsimile transmission/reception operation performed, such as date (DATE) and time (TIME) at which the relevant communication is performed, the name (DEST./SENDER) of a destination which the communication  
15 is addressed or a sender from which the communication is sent, data communication mode (MODE) currently applied, a time duration (TIME) taken for the communication, the total number of pages (PAGE) of the relevant facsimile transmission, the result (RESULT) of the communication  
20 (success/failure), and the file identification number (FILE) of the communication.

In the example described above, the communication management buffer may be cleared after the communication management information is transmitted via  
25 electronic mail as mentioned above, so that new data may



be stored there subsequently.

FIG. 3 is a flow chart which shows another operation of the network facsimile apparatus 10. The operation shown in FIG. 3 corresponds to operation in which the communication management report is automatically transmitted via electronic mail when a cumulative communication charge result calculated for each particular user code previously registered in the network facsimile apparatus 10 exceeds a predetermined value. This case assumes that the network facsimile apparatus 10 is shared by a plurality of users, each user has his/her own unique user code, and the user code should be input when each user uses this network facsimile apparatus 10.

First, an operation for a facsimile transmission is performed (in Step S201). After producing and storing a communication management data in a predetermined format such as that mentioned above and including the user code (In Step S202), a communication charge/fare is calculated for each communication occurrence for each user code (in Step S203), and a reference communication charge value previously registered in the network facsimile apparatus 10 is read out (in Step S204). After that, the reference communication charge value is compared with the actual

cumulative communication charge result calculated for each user code, and, thus, it is determined whether or not there is any user code for which the actual cumulative communication charge result exceeds the  
5 reference communication charge value (in Step S205).

When there is no record (No in Step S205), the current processing is terminated. Otherwise, when there occurs any (Yes in Step S205), it is determined whether or not a setting is previously made such that a report  
10 is sent out via electronic mail (in Step S206). When there is no such a setting (No in Step S206), the current processing is terminated. However, otherwise, when such a setting is previously made (Yes in Step S206), the communication management report is produced  
15 from the communication management information in the communication management buffer, and is transmitted to host apparatuses 40 via the communication network 30 via electronic mail (in Step S208).

The subject name of the electronic mail is,  
20 for example, 'communication management report - charge excess report'. In the above-mentioned case, the common or particular reference communication charge is registered for each user. However, instead, it is also possible that the total communication charge for all the  
25 user codes may be registered as a reference value to be

compared with the actual total. Further, actually, the communication management report to be transmitted may be one which is appropriately modified from the original communication management information stored in the communication management buffer such that the information is sorted for every user code, or so.

FIG. 4 is a flow chart which shows another operation of the network facsimile apparatus 10 shown in FIG. 1. The operation shown is an operation in which the communication management report is transmitted via electronic mail when the total cumulative number of communication occurrences (i.e., how many times a facsimile transmission has been performed in this apparatus) recorded for each user code exceeds a predetermined reference value registered previously in the network facsimile apparatus 10.

First, an operation for a facsimile transmission is performed (in Step S301). Then, after producing and storing the communication management data on the communication (in Step S302), the cumulative number of communication operations occurring is calculated/updated for every user code (in Step S303). And then, a reference number of communication operations previously registered is read (in Step S304). Then, the reference number of communication operations is compared

with the number of communication operations actually occurring recorded for every user code, and it is determined whether or not there is any user code for which the cumulative number of communication operations  
5 occurring exceeds the reference number (in Step S305).

When there is none exceeding, the current processing is terminated (No in Step S305). Otherwise, when any exceeding the reference number, then it is determined whether or not a setting of performing e-mail  
10 (electronic mail) report is previously made (Yes in Step S305, and in Step S306). When such a setting is not made, the current processing is terminated (No in Step S306). Otherwise, when such a setting is previously made, an electronic mail transmitting the communication  
15 management report is produced (Yes in Step S306, and in Step S307). Then, e-mail transmission of the communication management report is carried out (in Step S308). The subject name of the electronic mail may be 'communication management report - communication number  
20 excess report', for example.

In the above-mentioned case, the reference communication number is registered for each user. However, instead, it is also possible that the total communication number for all the user codes may be  
25 registered as a reference value to be compared with the

actually total values. Further, actually, the communication management report to be transmitted may be one which is appropriately modified from the original communication management information stored in the  
5 communication management buffer such that the information is sorted for every user code, or so.

FIG. 5 is a flow chart which shows another operation of the network facsimile apparatus shown in FIG. 1. The operation shown in this figure is operation  
10 in which the communication management report is transmitted via electronic mail periodically based on date/time information registered in this facsimile apparatus 10. First, it is determined whether or not a predetermined setting of e-mail transmission of  
15 communication management report is previously made (in Step S401). When no such a setting is made, the processing is terminated (No in Step S401; NO). Otherwise, when such a setting is previously made, the date/time information registered is read out from the  
20 system memory (Yes in Step S401, and in Step S402).

Then it is determined whether or not the registered date/time has been passed (step S403). When it has not been passed, no further operation is carried. However, when the registered date/time has been passed,  
25 the communication management report is produced from the

communication management information (Yes in Step S403,  
and in Step S404), and e-mail transmission of the  
communication management report is carried out (in Step  
S405). The subject name of the e-mail is 'communication  
5 management report - periodic report'.

FIG. 6 is a flow chart which shows another  
operation of the network facsimile apparatus shown in  
FIG. 1. The operation shown in this figure is operation  
in which a communication management report concerning  
10 transmission errors is transmitted via electronic mail  
periodically based on check interval information  
registered in this facsimile apparatus 10. The  
transmission error means a facsimile transmission which  
has not arrived at a destination properly.

15 First, it is determined whether or not a  
predetermined setting of e-mail transmission of  
communication management report is previously made (in  
Step S501). When no such a setting is made, the  
processing is terminated (No in Step S501; NO).  
20 Otherwise, when such a setting is previously made, the  
check interval information is read out, and, at the same  
time, a predetermined elapse time measurement counter is  
reset to zero (Yes in Step S501, and in Step S502).

Then it is determined whether or not the  
25 registered check interval has been elapsed by comparing

the count value in the elapse time measurement counter with the registered check interval (step S503). When it has not elapsed, no further operation is carried. However, when the registered interval has elapsed, it is  
5 determined whether or not any transmission error has occurred during the interval currently having elapsed (Yes in Step S504, and in S505). Then, when no transmission error has occurred, no further operation is performed. However, if any transmission error has  
10 occurred during the interval, the communication management report is produced from the communication management information stored until then (Yes in Step S505, and in Step S506), and e-mail transmission of the communication management report is carried out (in Step  
15 S507). The subject name of the e-mail is 'communication management report - transmission error report'.

The communication management information to be reported via the e-mail of the communication management report in this case at least includes information  
20 concerning transmission errors occurring during the check interval currently having elapsed. The transmission error means a communication of facsimile transmission or so which is, as mentioned above, even once transmitted but does not arrive at the relevant  
25 destination properly. For example, in the ordinary

communication management report such as that shown in FIG. 14, the result (RESULT) of 'NG' indicates such a transmission error.

Next, a user can easily change the contents of registration or setting made in the network facsimile apparatus 10 concerning the function of the communication management report described above with reference to FIGS. 2-6, with a procedure/guidance given on the operation display 17 such as that shown in FIGS. 7A through 7E, for example, by the system control 14.

As shown, a guidance message such as "set a document and specify an address" is displayed on the operation display 17 of FIG. 1 in a standby mode, and, according thereto, a user should input a destination address such as an e-mail address of "abc@xxx.yy.zz", for example. Then, after confirming the contents thus input by himself/herself on the display, the user should make various settings also on the operation display 17 as to whether or not the e-mail transmission of the communication management report should be performed in an automatic output timing, whether or not the report should be made when the cumulative communication charge result exceeds the predetermined value, or so, with arrow keys accompanying the operation display 17 operated by the operator, concerning the functions



described above with reference to FIGS. 2 through 6.

Furthermore, it is preferable that the plotter  
12 prints out 'mail report setting list' such as that  
shown in FIG. 8, and, thus, the user can easily  
5 recognize the contents of current settings concerning  
the functions described above with reference to FIGS. 2  
through 6.

The mail report setting list shown in FIG. 8  
indicates the following contents:

10 For each communication management destination  
which is previously registered:

whether or not the report is made in  
automatic output timing (or periodically);

whether or not the report is made upon an  
15 excess of the cumulative communication charge result  
over the predetermined value;

whether or not the report is made upon an  
excess of the cumulative number of communication  
occurrences over the predetermined value;

20 whether or not periodic report is made,  
and, if yes, how frequently (interval in days) and what  
time in the day the report is made; and

whether or not periodic report of  
transmission error occurrences is made, and, if yes, how  
25 frequently the report is made.

Next, FIG. 9 is a flow chart which shows another operation of the network facsimile apparatus 10. Operation shown in this figure is an operation in a case of making the communication management information mail  
5 to the addresses beforehand registered whenever erroneous communication occurrences come to amount a fixed number of times.

First, a communication is made in Step S601. After that, in Step S602, a communication management  
10 data thereof is stored. Then, based thereon, in Step S603, it is determined whether or not the relevant communication is finished successfully or failed in result. If it is finished successfully, the current processing is terminated without carrying out any other  
15 special operation (No in Step S603). However, if the relevant communication is not finished successfully, the count number of an error counter managed by the system control 14 is incremented by one (Yes in Step S603, and in Step S604), and a previously registered reference  
20 value on the number of erroneous communication occurrences in the network facsimile apparatus is read out (in Step S605).

Then, the current count value of the error counter is compared with the registered number of  
25 erroneous communication occasions (in Step S606). Then,

if the count value does not reach the registered number (No in Step S606), the current processing is terminated without carrying out any other special operation.

However, if the count value has reached the registered  
5 number, the count value of the error counter is cleared to zero (Yes in Step S606, and in Step S607), an electronic mail of the communication management information including these erroneous communication occurrences is produced, and is transmitted to the  
10 addresses (40-1 through 40-n) (in Steps S608 and S609). Then, the current processing is terminated.

The communication management information transmitted in this case should include at least information concerning the actual erroneous  
15 communication occurrences, or may further include several times of communication occurrences around the erroneous communication occurrences.

FIG. 10 is a flow chart which shows another operation of the network facsimile apparatus 10.

20 Operation shown in FIG. 10 is an operation in a case of making a communication management report e-mail according to a user code to the addresses (40-1 through 40-n) previously registered. First, predetermined date/time information, and may include information of  
25 timing as to whether or not the e-mail reporting

operation is started in a predetermined day of every week, what time in the day the operation is started and so forth, is read (in Step S701). Then, it is determined in Step S702 whether or not the registered  
5 timing is passed. If it is not passed, this monitoring process is continued without carrying out any other special operation (No in Step S702). If the predetermined timing is passed, an electronic mail of the communication management report is created for every  
10 user code registered (Yes in Step S702, and in Step S703), the e-mail transmission is carried out to the addresses (40-1 through 40-n) registered beforehand (in Step S704). After that, the current processing is terminated.

15               A user may change the registration and setting of the report transmission destination easily with a procedure/guidance such as those shown FIGS. 11A through 11C, 12A through 12C and 13A through 13C, for example, For example, the registered number of erroneous  
20 communication occurrences can be registered into the apparatus with a procedure/guidance as shown in FIGS. 11A through 11C, and the above-mentioned timing in which the e-mail transmission of the report is made can be registered into the apparatus with a procedure/guidance  
25 as shown in FIGS. 12A through 12C.

Although these examples set the reporting timing as to whether or not reporting is made at a predetermined day of the week and what time in the day the reporting is performed, it is also possible that any  
5 other specific date/time may be set for the timing of the above-mentioned reporting. Further, a reporting destination for the purpose of mail backup may be further registered into the apparatus with a procedure/guidance as shown in FIGS. 13A through 13c,  
10 and e-mail transmission may be carried out also to this destination for mail backup at every time of the e-mail transmission. Accordingly, even in a case where the communication management information sent to the first destination via electronic mail is lost by some cause,  
15 as the same contents are also sent to the above-mentioned destination for mail backup, the lost information can be restored therefrom.

Further, the present invention is not limited to the above-described embodiments, and variations and  
20 modifications may be made without departing from the basic concept of the present invention.

The present application is based on Japanese priority application No. 2002-192072, filed on July 1, 2002, the entire contents of which are hereby  
25 incorporated by reference.